

DESCRIPTION OF THE LARVA OF *HETAERINA INFECTA* CALVERT
(ODONATA: CALOPTERYGIDAE)

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Abstract.—The larva of *Hetaerina infecta* Calvert is described and illustrated based upon two exuviae of reared final instar larvae, and six last instar larvae. The larva of this species is compared to its close relative *H. capitalis* Selys. Data on distribution, habitat and habits, as well as a key to larvae for the Mexican species of *Hetaerina* are provided.

Resumen.—Se describe e ilustra la larva de *Hetaerina infecta* Calvert con base en dos exuvias del último estadio larval obtenidas por cría, y de seis larvas de último estadio. La larva de esta especie se compara con la de su pariente más próximo, *H. capitalis* Selys. Se proporcionan datos sobre su distribución, hábitat y hábitos, así como una clave para las especies mexicanas de *Hetaerina*.

Key Words: Larva, description, key, *Hetaerina*, Calopterygidae, Odonata, Hidalgo State, Mexico

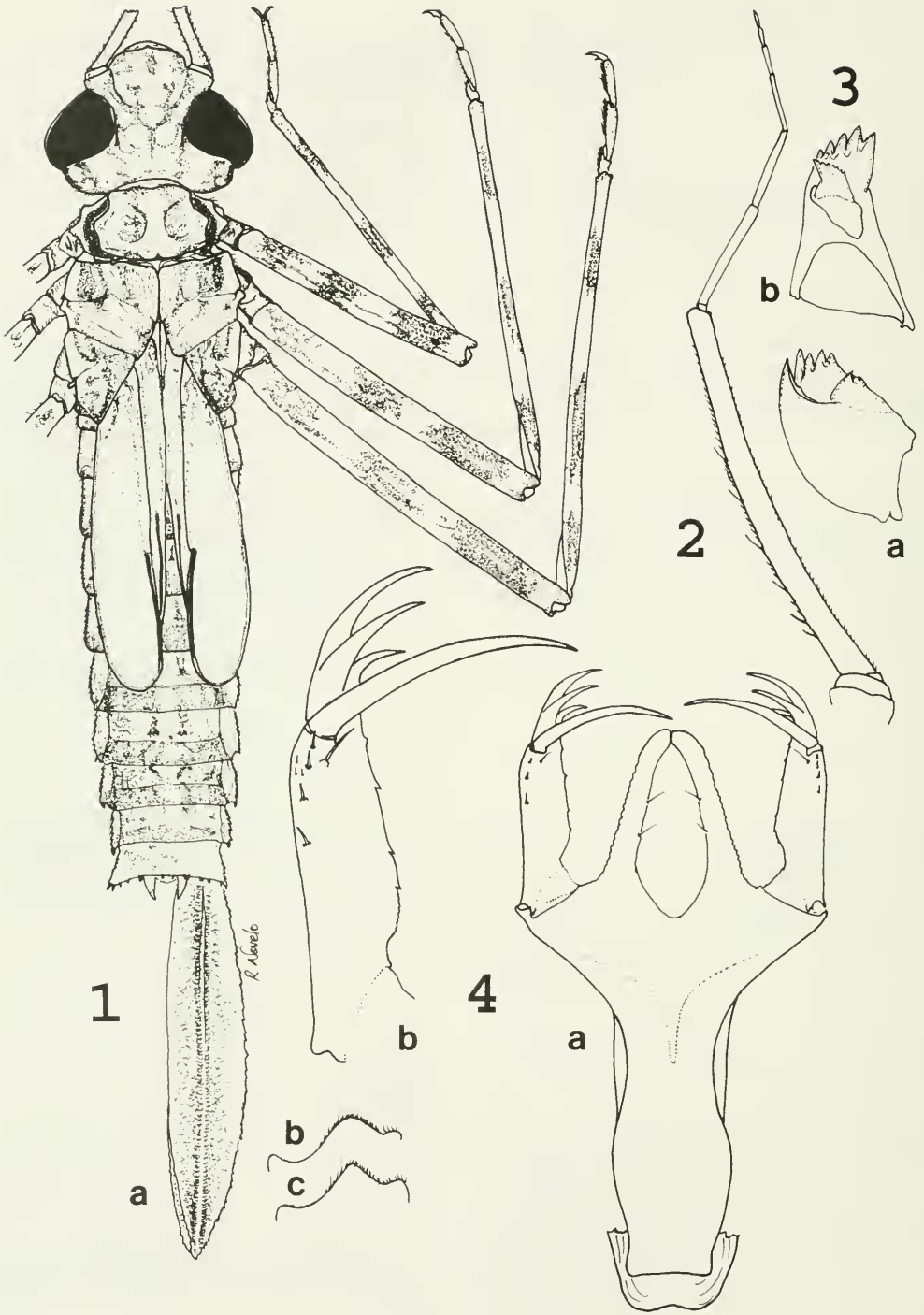
The Neotropical genus *Hetaerina* currently comprises 37 species (Garrison 1990). Of these, 15 have had their larvae described, although one of them by supposition: *H. americana* (Fabricius) (Needham 1903), *H. auripennis* (Burmeister) (Santos 1970a), *H. brightwelli* (Kirby) (Santos 1972), *H. caja* (Drury) (Geijskes 1943; Zloty et al. 1993); *H. capitalis* Selys (De Marmels 1985; Zloty et al. 1993); *H. cruentata* (Rambur), *H. fuscoguttata* Selys (Zloty et al. 1993), *H. hebe* Selys (Santos 1970b), *H. majuscula* Selys, *H. miniata* Selys (Zloty et al. 1993); *H. moribunda* Hagen (Geijskes 1943 by supposition), *H. occisa* Hagen in Selys (Geijskes 1946; Zloty et al. 1993); *H. sempronina* Hagen in Selys (Zloty et al. 1993); *H. titia* (Drury) (Byers 1930; Zloty et al. 1993); *H. vulnerata* Hagen in Selys (Provonsha and McCafferty 1973). In Mexico, 11 species have been recorded (González-Soriano and Novelo-Gu-

tiérrez 1996) of which only three remain with larvae unknown: *H. infecta* Calvert, *H. pilula* Calvert and *H. rudis* Calvert. Here, I provide the description of the larva of *H. infecta*.

Hetaerina infecta Calvert
(Figs. 1–12)

Material examined.—2 exuviae (♂, ♀ reared), 6 last instar larvae (2 ♂, 4 ♀). MEXICO: Hidalgo State, Pemuxtilla, Rio Zacuala (800 m asl), 10-MARCH-1994, R. Novelo leg., 1 ♂, 2 ♀; 8-APRIL-1994, R. Novelo leg., 2 ♂, 2 ♀; Calnali (1,350 m asl), 9-APRIL-1994, R. Novelo leg., 1 ♀. All deposited in the Entomological Collection of Instituto de Ecología, A.C., Xalapa (IEXA).

Description.—Exuviae yellowish brown; mature larva yellowish with dark bands and dots (Fig. 1a); hind legs, when fully extended, exceeding caudal appendages; and



Figs. 1-4. Details of morphology of *Hetaerina* larvae. 1a,b-4, *H. infecta*; 1c, *H. capitalis*. 1a, Dorsal view of last instar larva (♀) (left legs and antennae omitted, left paraprot and epiproct detached). 1b, 1c, Dorsolateral view of pronotum showing lateral protuberance. 2, Right antenna, dorsal view. 3a, Ventrointernal view of right mandible. 3b, Internal view left mandible. 4a, Prementum, dorsal view. 4b, Detail of left labial palp, dorsal view.

long, triquetral, pointed paraprocts; with lateral spines on the last four abdominal segments.

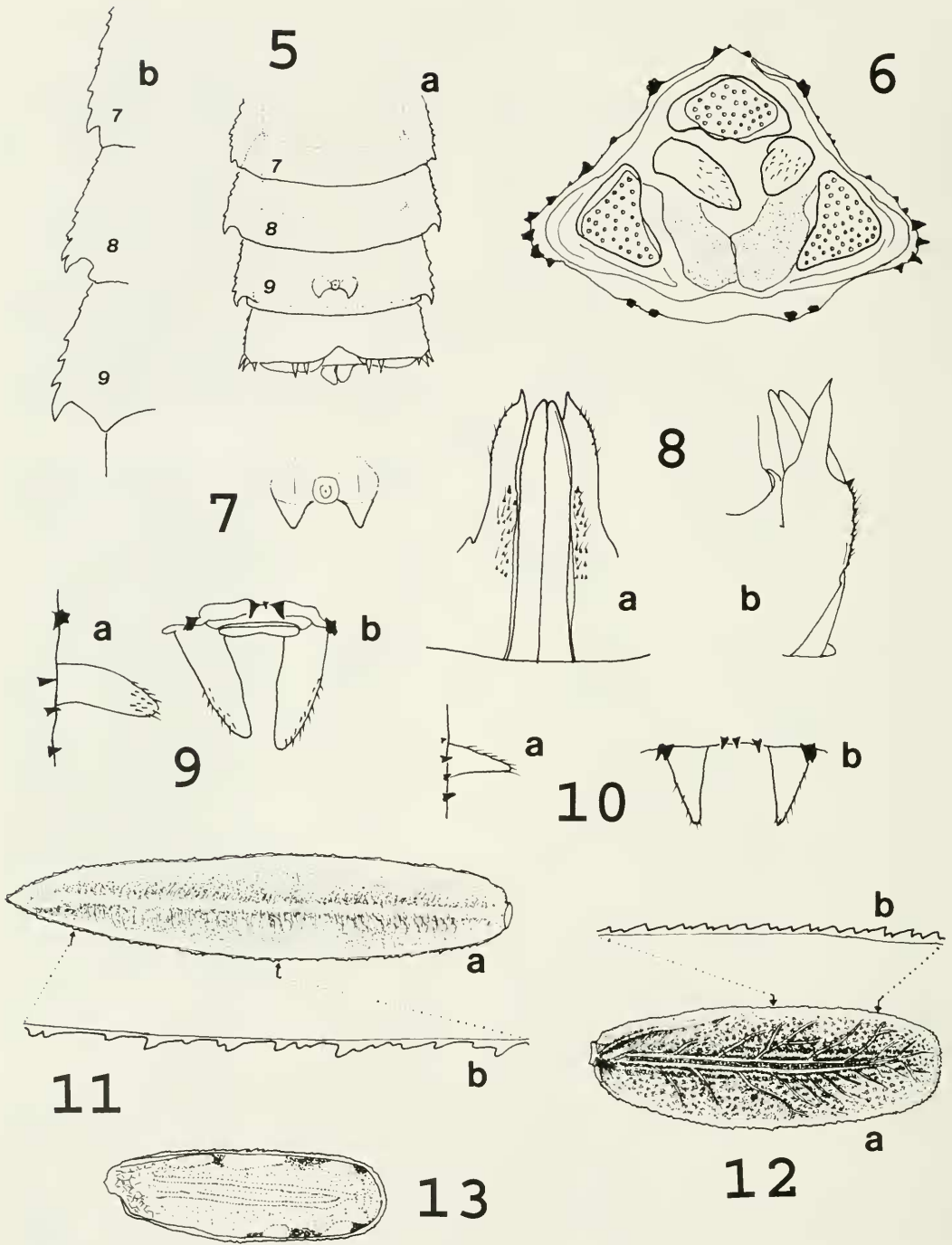
Head: Moderately flattened, maculation pattern as in Fig. 1a, maximum width 4.68–4.71 mm; cephalic lobes with a postero-lateral low rounded tubercle; occiput widely concave. Antenna 7-segmented (Fig. 2): length of scape 4.06–4.11 mm, 85% of head width, with no setae on inner side exceeding one-third width of scape; relative sizes of antennomeres: 1.0, 0.33, 0.22, 0.14, 0.08, 0.06, 0.04. Mouthparts creamy colored; labrum widely notched at apical margin. Mandibles with a separated molar lobe (Fig. 3), right mandible with five incisor cusps, subventral cusp largest and ventral one with a small cusp at its base, molar lobe poorly developed, consisting of two small cusps (Fig. 3a); incisor area of left mandible with five cusps, subventral cusp largest, molar lobe with seven cusps, dorsal one largest (Fig. 3b). Maxilla: Galeolacinia with seven teeth, three long slightly incurved teeth on dorsal margin, three short slightly incurved teeth on ventral margin, apical tooth largest; maxillary palp shorter than galeolacinia, ending in a robust blunt spine. Labium: Prementum-postmentum articulation reaching posterior margin of mesosternum; prementum long (Fig. 4a), basal half narrow then suddenly widened at 65% of length, maximum width of prementum 3.5 mm; depth of median cleft 2.0 mm or 57% of maximum premental width; two setae on internal side of each lobe of ligula, external margin of ligula's lobes serrate. Labial palp (Fig. 4b) ending in three, long, sharply-pointed hooks, median longest, with a short seta near articulation of movable hook, and a row of 4–5 spiniform setae on apical 25% of dorsal margin; internal margin finely serrulated with small spines subequally distributed along it.

Thorax: Nota pale, yellowish brown, pleura dark brown; anterior margin of pronotum concave at middle, posterior margin straight at middle; lateral margin with a low, rounded lateral slightly upturned pro-

tubérance (Fig. 1b); inferior margin of propleura with two protuberances, that on proepimeron biggest; inferior margin of meso- and metapleura with small digitiform protuberance near pleural suture. Legs long and slender (Fig. 1), pale, with three dark brown rings on all femora and tibiae; profemur with many, terminally curved, pointed spines on anterior border, neither long thin hairs nor prominent spines on posterior border. Anterior and posterior wing pads wholly pale except for dark stripe on apical third of costal margin, reaching posterior margin of abdominal segment five and basal half of abdominal segment six respectively.

Abdomen: Without middorsal protuberances; lateral carinae with row of spines on segments 2–9 increasing in length caudally, those of 7–9 ending in a spine which is small on 7, stout and slightly incurved on 8–9 (Fig. 5). Posterior border of tergites 8–9 lacking row of spines. Posterior margin of segment 10 with 22–23 spines arranged as follows (Fig. 6): 2–3 small middorsal spines, one large dorsolateral spine lateral to midline; 3 dorsolateral spines, 2 large lateral spines and 2 large lateroventral spines on each side, and 2 large ventrolateral spines lateral to midline. Male gonapophyses pyramidal (Fig. 7), not reaching posterior margin of sternite 9. Female gonapophyses (Fig. 8) almost reaching posterior margin of sternite 10; in ventral view (Fig. 8a), apical half of lateral valvae digitiform, slightly convergent, and with small acutely-pointed tips; in lateral view as in Fig. 8b.

Caudal appendages: Male cercus digitiform (Fig. 9), bluntly-pointed (Fig. 9a), convergent in dorsal view (Fig. 9b), and as long as tergite 10. Female cercus conical (Fig. 10), acutely-pointed (Fig. 10a), slightly convergent (Fig. 10b), 50% as long as tergite 10. Paraprocts triquetral (Fig. 11), in lateral view parallel-sided at basal 70%, then edges gradually convergent; all carinae armed with irregularly sized and spaced spines (Fig. 11b); length:width proportion 5:1, all surfaces densely pigmented except



Figs. 5-13. Details of morphology of *Hetaerina* larvae. 5-12, *H. infecta*. 13, *H. capitalis*. 5a, Ventral view of sternites 7-10 (σ). 5b, Dorsolateral view of lateral carinae of abdominal segments 7-9. 6, Caudal view of 10th abdominal segment showing distribution of marginal spines. 7, Ventral view of male gonapophyses. 8, Female gonapophyses: a, ventral view; b, left lateral view. 9, Male cerci: a, left lateral view; b, dorsal view. 10, Female cerci: a, left lateral view; b, dorsal view. 11, Right paraproct: a, right lateral view; b, detail of part of ventral border. 12, Epiproct: a, left lateral view; b, detail of part of dorsal border. 13, Epiproct, left lateral view (redrawn from De Marmels 1985).

for central, longitudinal, pale band, sometimes with pale oval areas on margins. Epiproct largely foliaceous, laterally compressed except for basal 40% which is triquetral in cross-section, parallel-sided in lateral view with apex broadly rounded; pigmentation as in paraprocts, although exuviae with color pattern as in Fig. 12; length:width proportion 3:1, 66–72% as long as paraprocts.

Measurements (in mm).—Exuviae (in alcohol): Total length (excluding caudal appendages) 21.5–22; paraprocts 9.1–9.3; epiproct 6.2; hind femur 8–8.1; male cerci 0.7. Last instar larva (in alcohol): Total length (excluding caudal appendages) 20–20.3; paraprocts 9.4–9.5; epiproct 6.2–6.3; hind femur 7.6–7.9; male cercus 0.65, female cercus 0.4.

Distribution, habitat and habits.—In Mexico, *H. infecta* together with *H. capitalis* and *H. rudis* form the group of “giant ruby-spots” which inhabit mountainous shaded streams at altitudes from 800 to 1800 m running through cloud forests. *Hetaerina infecta* has been recorded from the states of Chiapas, Hidalgo, Nayarit, Oaxaca, San Luis Potosi, and Veracruz (González-Soriano and Novelo-Gutiérrez, 1996). In Hidalgo State, *H. infecta* coexisted sympatrically with *H. capitalis* and *H. cruentata*; larvae of the first two species were found among decayed leaves and twigs in zones of moderately flowing water, and also on big rocks at the bottom of small, clear, still water pools, in the same manner as larvae of *Archilestes* spp. Larval populations of *H. infecta* are apparently smaller than those of the closely related *H. capitalis*. Only two adult specimens of *H. infecta* were reared; they emerged two days after capture as ultimate instar larvae on 10-April-1994, very early in the morning when still dark (ca. 0500 h).

DISCUSSION

The larva of *Hetaerina infecta* closely resembles that of *H. capitalis* in several details of its morphology, although they are

easily separated by the following features (those of *H. capitalis* in parentheses): Maximum width of head 4.7 mm (4 mm); depth of median cleft 57% of the maximum premental width (45%); lateral protuberance of pronotum widely rounded (Fig. 1b) (more acute [Fig. 1c]); lateral carinae of abdominal segments 4–9 spiny, those of 7–9 ending in a spine (only segments 8–9); length:width ratio of paraprocts 5:1 (4.25:1); epiproct 66–72% of length of paraprocts (60%).

Neither De Marmels (1985) nor Zloty et al. (1993) described the maculation pattern of the caudal appendages of *Hetaerina capitalis* (although De Marmels, provided an excellent illustration). I found that color pattern usually is the best feature to separate larvae of these species in the field. *Hetaerina capitalis* have pronounced oval pale areas along the margins of epiproct (Fig. 13) and paraprocts, while *H. infecta* usually do not, although sometimes these pale areas are barely visible. In *H. infecta* the caudal appendages are concolorous (Figs. 11–12).

KEY TO LARVAE OF MEXICAN *HETAERINA*

This key follows Zloty et al. (1993), modified to include only Mexican species.

- 1. One pair of premental setae 4
- Two pairs of premental setae 2
- 2. Row of spines on posterior borders of abdominal tergites 8–9; without lateral pronotal protuberances; paraprocts covered with short, tubercular spines *sempronia*
- Row of spines on posterior borders of abdominal tergites 8–9 lacking; with lateral pronotal protuberances; paraprocts without tubercular spines 3
- 3. Lateral pronotal protuberances broadly rounded in dorsolateral view (Fig. 1b); lateral carinae of abdominal segments 2–9 with row of spines which are more conspicuous on 4–9, posterolateral margins of 7–9 ending in a spine which is small on 7, flat and large on 8–9; posterior margin of segment 10 with 22–23 spines (Fig. 6) *infecta*
- Lateral pronotal protuberances more acute in dorsolateral view (Fig. 1c); lateral carinae of segments 8–9 with a row of conspicuous spines, ending in a postero-lateral flat large

- spine; posterior margin of segment 10 with 16–17 spines *capitalis*
4. Mid-dorsal protuberances on abdominal segments 1–9 *cruentata*
- Mid-dorsal abdominal protuberances lacking 5
5. Anterior border of profemur with a few, short, thorn-like spines *caja*
- Anterior border of profemur without conspicuous spines 6
6. Postero-lateral abdominal spines on segments 8–10 8
- Postero-lateral abdominal spines on segments 9–10 7
7. Labial palp with 3–4 spiniform setae at base of movable hook; each lobe of ligula almost twice as wide at base than maximum width of median cleft *americana* (in part)
- Labial palp with 5–7 spiniform setae at base of movable hook; lobes of ligula narrower basally than the greatest width of the cleft *vulnerata*
8. Lobes of ligula wider basally than maximum width of median cleft; basal half of prementum 0.33 as wide as length of prementum *americana* (in part)
- Lobes of ligula almost as wide at base as maximum width of the median cleft; basal half of prementum 0.25 as wide as length of prementum 9
9. Antennal scape with some stiff setae on inner side; pronotal protuberances small and situated at midsegment *titia*
- Antennal scape with some long, fine hairs; pronotal protuberances broadly-based and extending to posterior end of segment *occisa*

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